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U.S. Fish and Wildlife Service
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AESO/SE
02-21-03-F-0046

April 28, 2003

Ms. Elaine Zieroth
Forest Supervisor
Apache-Sitgreaves National Forest
P.O. Box 640
Springerville, Arizona 85938-0640

RE: Coleman and Marks Ditch Diversion Repair

Dear Ms. Zieroth:

Thank you for your request for consultation with the U.S. Fish and Wildlife Service pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your April 15, 2003, request for formal consultation was received on April 17, 2003. This biological opinion is based on our review of the April 15, 2003, biological assessment and evaluation, telephone conversations with Bill Wall and Terry Meyers, and other sources of information. The proposed action is to provide temporary repairs to two diversion structures and provide reasonable maintenance activities until a complete restructuring of the diversion can be completed at a later date. The two diversion structures are located on the Blue River, in Greenlee County, Arizona. At issue are impacts that may result from the proposed project on loach minnow (*Tiaroga cobitis*) and its critical habitat, spikedace (*Meda fulgida*) critical habitat, and Chiricahua leopard frogs (*Rana chiricahuensis*). In addition, the Forest determined that the proposed action will not jeopardize the continued existence of the Mexican gray wolf (*Canis lupus baileyi*) and is not likely to adversely affect spikedace, razorback suckers (*Xyrauchen texanus*), or bald eagles (*Haliaeetus leucocephalus*). The FWS concurs that the proposed action is not likely to adversely affect spikedace or bald eagles and that the project will not jeopardize the continued existence of the Mexican gray wolf. Details for these concurrences are provided in Appendix A. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Consultation History

- February 05, 2002 – Forest Service contacted the Fish and Wildlife Service concerning work to diversion structures in the Blue River.
- April 03, 2002 – Meeting with Forest Service, U.S. Army Corps of Engineers, and U.S. Fish and Wildlife Service to discuss unauthorized repairs to diversion structures on the Blue River.
- November 22, 2002 – Letter from the U.S. Fish and Wildlife Service to the Forest Service concerning the Blue River diversions, repair, and maintenance.
- April 09, 2003 – Received a draft Biological Assessment and Evaluation (BAE) for the Coleman and Marks ditch diversion repair project.
- April 15, 2003 – Received final BAE including a request for an expedited consultation and requested that a draft biological opinion not be sent. We also encouraged the Forest Service to coordinate the review of this project with the Arizona Game and Fish Department.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed action is to repair the existing ditch diversion in order to receive historical flows of water for agricultural purposes, while providing at least minimal flow for instream critical habitat.

The action area consists of two separate areas, each totalling approximately 1 mile. Both the Coleman and Marks diversion are located along the Blue River (Figure 1, Appendix B). The action area was based on how far low flow disturbed sediment is estimated to travel down stream based on channel type and amount of instream sediment. The Marks diversion is 5 miles upstream of the Coleman diversion. The Coleman diversion is approximately at river mile 33 (river mile's begin at the mouth of the confluence of the Blue and San Francisco rivers) (Figure 2, Appendix B). The action area includes the area just below the Grant Creek Trail Head to approximately an additional 0.50 miles downstream of the Lee Ranch boundary. This area includes approximately 0.75 miles of stream. The Marks diversion is approximately at river mile 38 (Figure 3, Appendix B). The action area includes the area just below the Cow Canyon trail river crossing downstream to approximately 0.5 miles downstream of the confluence of Lamphier Creek. This area includes approximately 0.75 miles of stream.

In addition, 400 ft along the stream bank at each of the diversion site's is considered part of the action area to allow movement of the machinery for the work.

All initial repair work will be supervised by the District Fisheries Biologist. Any activity within the active channel will adhere to the following protocol.

The project consists of two parts. Initial work will consist of building a temporary diversion structure. This will occur at the end of April 2003. The Forest indicates that additional work may have to be

done on the diversion structure if a high flow event occurs before a permanent structure is constructed (projected to occur between September 2003 and June 2004). Additional work is only expected to occur at the most one time before the permanent structure is built. The additional work will adhere to the project description for building of the temporary diversion. The second part of the project consists of maintenance and cleaning of the existing diversion ditch. Maintenance or cleaning of the diversion structure may occur more than once, but must adhere to the procedures designed by the Forest every time.

Before work is to begin, the area where instream work will occur will be electroshocked to remove all fish and amphibians with a 90% confidence limit using a three-pass depletion method (Reynolds 1983). The lack of habitat complexity should provide a high level of success. Native fishes will then be placed upstream of the instream project area and excluded using block nets during the work period. The work period will be less than six hours and will occur in April 2003. Species, weight, and length of each fish will be recorded. In addition to electroshocking, the area will be visually surveyed for any frogs or egg masses in the project area. Any frogs or egg masses found will also be placed upstream of the project area.

The diversion structure will be constructed with river rock and plastic sheeting. The plastic sheeting will be used instead of fine sediment, as was previously used, to help stop the flow of water through the structure. A backhoe will be used to move the material into the active channel and construct the diversion. An additional log may be used to help support the structure.

The diversion structure will be no higher than the midpoint height of the upper ditch culvert in order to minimize the height of the diversion structure while maintaining ditch flows and increasing instream flows over baseline conditions. The culvert will remain at its present height and size. The height will be the difference between the present thalweg (the longitudinal outline of the riverbed from source to mouth) and the midpoint of the culvert using a laser level.

Only clean river run rock (absent fines) and plastic sheeting will be used for the diversion structure compared to the historical use of floodplain sediment and river rock. The adjacent ditch sediment material will be removed off-site of the floodplain, thus reducing the influx of instream sediment from the annual repair activity. Only a rubber tire backhoe (equal to or less than 15,000 pound operating weight) will be used within the stream. No digging within the stream will occur to minimize the disturbance of cemented (tightly adhering) sediment.

All machinery will be steam-cleaned and verified by the contractor to be free of all leaks from petroleum products before work is conducted in the active channel. Any presence of leakage of petroleum products by a particular piece of machinery will be cause for the immediate removal of the equipment until the leak is repaired and verified by the contractor to be clean and leak free. All fueling and addition of petroleum products will occur on relatively flat ground at least 10 feet outside of the floodplain. All petroleum refueling containers will remain at least 10 feet outside of the floodplain.

Maintenance during the time before the permanent structure is built may occur under the proposed project. However, maintenance only includes the cleaning of the ditch. Deepening, widening, or any other modification of the ditch is not allowed analyzed or permitted.

Cleaning of the ditch within the easement will only be done during low flow and when the overflow next to the headgate is not flowing. Before the ditch section between the culvert and the river is cleaned, the front of the ditch adjacent to the river will be blocked with hay bales and remain blocked until sediment settles within this section. The height of the bales must be sufficient to protect from over-splash during cleaning. All dredge material from the ditch must be either hauled off-site or spread evenly within the floodplain.

Only a rubber tire backhoe (equal to or less than 15,000 pound operating weight) or smaller with rubber tires will be used for maintenance. All machinery will be verified by the contractor to be free of leaks from petroleum products. Any presence of leakage of petroleum products by any particular machinery will be cause for the immediate removal of that equipment until the leak is repaired and verified by the contractor to be clean and leak free. All fueling and addition of petroleum products will occur on relatively flat ground at least 10 feet outside of the floodplain. All petroleum-refueling containers will remain at least 10 feet outside of the floodplain.

STATUS OF THE SPECIES (range wide and/or recovery unit)

Loach Minnow

Loach minnow was listed as a threatened species on October 28, 1986 (USFWS 1986a). Critical habitat was designated for loach minnow on April 25, 2000 (USFWS 2000). Critical habitat includes portions of the Verde, Black, middle Gila, San Pedro, San Francisco, Tularosa, Blue, and upper Gila rivers and Eagle, Bonita, Tonto, and Aravaipa creeks, and several tributaries of those streams.

Loach minnow is a small, slender, elongate fish with markedly upwardly-directed eyes (Minckley 1973). Historic range of loach minnow included the basins of the Verde, Salt, San Pedro, San Francisco, and Gila rivers (Minckley 1973, Sublette *et al.* 1990). Habitat destruction plus competition and predation by nonnative species have reduced the range of the species by about 85 percent (Miller 1961, Williams *et al.* 1985, Marsh *et al.* 1989). Loach minnow remains in limited portions of the upper Gila, San Francisco, Blue, Black, Tularosa, and White rivers and Aravaipa, Turkey, Deer, Eagle, Campbell Blue, Dry Blue, Pace, Frieborn, Negrito, Whitewater and Coyote creeks in Arizona and New Mexico (Barber and Minckley 1966, Silvey and Thompson 1978, Propst *et al.* 1985, Propst *et al.* 1988, Marsh *et al.* 1990, Bagley *et al.* 1995, USBLM 1995, Bagley *et al.* 1996, Miller 1998).

Loach minnow is a bottom-dwelling inhabitant of shallow, swift water over gravel, cobble, and rubble substrates (Rinne 1989, Propst and Bestgen 1991). Loach minnow uses the spaces between, and in the lee of, larger substrate for resting and spawning (Propst *et al.* 1988; Rinne 1989). It is rare or

absent from habitats where fine sediments fill the interstitial spaces (Propst and Bestgen 1991). Some studies have indicated that the presence of filamentous algae may be an important component of loach minnow habitat (Barber and Minckley 1966). Loach minnow feeds exclusively on aquatic insects (Schrieber 1978, Abarca 1987). Spawning occurs in March through May (Britt 1982, Propst *et al.* 1988); however, under certain circumstances loach minnow also spawn in the autumn (Vives and Minckley 1990). The eggs of loach minnow are attached to the underside of a rock that forms the roof of a small cavity in the substrate on the downstream side. Limited data indicate that the male loach minnow may guard the nest during incubation (Propst *et al.* 1988, Vives and Minckley 1990).

Recent biochemical genetic work on loach minnow indicate that there are substantial differences in genetic makeup between remnant loach minnow populations (Tibbets 1993). Remnant populations occupy isolated fragments of the Gila River basin and are isolated from each other. Based upon her work, Tibbets (1992, 1993) recommended that the genetically distinctive units of loach minnow should be managed as separate units to preserve the existing genetic variation.

When critical habitat was designated for loach minnow, the FWS determined the primary constituent elements for loach minnow. These elements include permanent, flowing, unpolluted water; living areas for loach minnow adults, juveniles, and larvae with appropriate flow regimes and substrates; spawning areas; low amounts of fine sediment and substrate embeddedness; riffle, run, and backwater components; low to moderate stream gradients; appropriate water temperatures; periodic natural flooding; an unregulated hydrograph, or, if flows are modified, a hydrograph that demonstrates an ability to support a native fish community; and, habitat devoid of non-native aquatic species detrimental to loach minnow, or habitat where such nonnative species are at levels which allow persistence of loach minnow. These constituent elements are generalized descriptions and ranges of selected habitat factors that are critical for the survival and recovery of loach minnow.

The appropriate and desirable level of these factors may vary seasonally and is highly influenced by site-specific circumstances. Therefore, assessment of the presence/absence, level, or value of the constituent elements must include consideration of the season of concern and the characteristics of the specific location. The constituent elements are not independent of each other and must be assessed holistically, as a functioning system, rather than individually. In addition, the constituent elements need to be assessed in relation to larger habitat factors, such as watershed, floodplain, and streambank conditions, stream channel geomorphology, riparian vegetation, hydrologic patterns, and overall aquatic faunal community structure.

Seven individual critical habitat complexes make up critical habitat for loach minnow. Complex 1, the Verde River Complex, is currently unoccupied by loach minnow. The continuing presence of spinedace and the existence of suitable habitat create a high potential for restoration of loach minnow to the Verde system. Within Complex 2, the Black River Complex contains the Salt River Subbasin, which is a significant portion of loach minnow historical range. However, loach minnow have been extirpated from all but a small portion in the Black and White Rivers. The Black River complex is

considered vital to survival and recovery of the species because it is the only remaining population of loach minnow on public lands in the Salt River basin.

Loach minnow are presumed to have occupied Complex 3, the Tonto Creek Complex, as have spikedace. However, no records exist. Suitable habitat still exists, although degradation has occurred due to watershed uses, water diversion, agriculture, roads, and nonnative species introduction. Complex 4, the Middle Gila/Lower San Pedro/Aravaipa Creek Complex, is occupied by loach minnow. Within this complex, Aravaipa Creek supports some of the best and most protected loach minnow populations due to special use designations on Bureau of Land Management (BLM) land, substantial ownership by The Nature Conservancy, and planned construction of fish barriers to prevent invasion of nonnative fish species.

Complex 5, the Middle-Upper San Pedro River Complex, is currently unoccupied by loach minnow. However, the San Pedro River is the type locality of spikedace, and this complex contains important restoration areas. Complex 6, the Gila Box/San Francisco River Complex, includes the proposed action area in this consultation. Most of the complex is occupied by loach minnow, although the status varies substantially from one portion to another. Only Bonita Creek, Little Blue Creek, and the Gila River are currently unoccupied. The Blue River system and adjacent portions of the San Francisco River are the longest stretch of occupied loach minnow habitat unbroken by large areas of unsuitable habitat.

Complex 7, the Upper Gila River complex in Grant, Catron, and Hidalgo counties, New Mexico, is occupied throughout by loach minnow. Because of its remote location, there is a relatively low degree of threats.

Our information indicates that, rangewide, 155 consultations have been completed or are underway for actions affecting spikedace and loach minnow rangewide. The majority of these opinions concerned the effects of grazing (53 consultations), roads and bridges (24 opinions), or agency planning (23 opinions). Additional consultations (55 consultations) dealt with timber harvest, fire, flooding, recreation, realty, animal stocking, water development, recovery, and water quality issues. Adverse effects to loach minnow have occurred due to these projects and many of these consultations have required reasonable and prudent measures to minimize effects to loach minnow. However, the species is still declining.

The status of loach minnow is declining rangewide. Although it is currently listed as threatened, the FWS has found that a petition to uplist the species to endangered status is warranted. A reclassification proposal is pending, however, work on it is precluded due to work on other higher priority listing actions (USFWS 1994b).

Spikedace

Spikedace was listed as a threatened species on July 1, 1986 (USFWS 1986b). Critical habitat was designated on April 25, 2000 (USFWS 2000). Critical habitat includes portions of the Verde, middle

Gila, San Pedro, San Francisco, Blue, and upper Gila rivers and Eagle, Bonita, Tonto, and Aravaipa creeks and several tributaries of those streams.

Spikedace is a small silvery fish whose common name alludes to the well-developed spine in the dorsal fin (Minckley 1973). Spikedace historically occurred throughout the mid-elevations of the Gila River drainage, but is currently known only from the middle Gila, and upper Gila rivers, and Aravaipa and Eagle creeks (Barber and Minckley 1966, Minckley 1973, Anderson 1978, Marsh *et al.* 1990, Sublette *et al.* 1990, Jakle 1992, Knowles 1994, Rinne 1999). The species likely occurs in the upper Verde River, but it has not been documented since 1999 despite annual surveys. Habitat destruction along with competition and predation from introduced nonnative species are the primary causes of the species decline (Miller 1961, Williams *et al.* 1985, Douglas *et al.* 1994).

Spikedace live in flowing water with slow to moderate velocities over sand, gravel, and cobble substrates (Propst *et al.* 1986, Rinne and Kroeger 1988). Specific habitat for this species consists of shear zones where rapid flow borders slower flow, areas of sheet flow at the upper ends of mid-channel sand/gravel bars, and eddies at the downstream riffle edges (Propst *et al.* 1986). Spikedace spawns from March through May with some yearly and geographic variation (Barber *et al.* 1970, Anderson 1978, Propst *et al.* 1986). Actual spawning has not been observed in the wild, but spawning behavior and captive studies indicate eggs are laid over gravel and cobble where they adhere to the substrate. Spikedace lives about two years with reproduction occurring primarily in one-year old fish (Barber *et al.* 1970, Anderson 1978, Propst *et al.* 1986). It feeds primarily on aquatic and terrestrial insects (Schreiber 1978, Barber and Minckley 1983, Marsh *et al.* 1989).

Recent taxonomic and genetic work on spikedace indicate there are substantial differences in morphology and genetic makeup between remnant spikedace populations. Remnant populations occupy isolated fragments of the Gila basin and are isolated from each other. Anderson and Hendrickson (1994) found that spikedace from Aravaipa Creek is morphologically distinguishable from spikedace from the Verde River, while spikedace from the upper Gila River and Eagle Creek have intermediate measurements and partially overlap the Aravaipa and Verde populations. Mitochondrial DNA and allozyme analyses have found similar patterns of geographic variation within the species (Tibbets 1992, Tibbets 1993).

When critical habitat was designated, the FWS determined the primary constituent elements for spikedace. Constituent elements include those habitat features required for the physiological, behavioral, and ecological needs of the species. For spikedace, these include permanent, flowing, unpolluted water; living areas for adult spikedace with slow to swift flow velocities in shallow water with shear zones where rapid flow borders slower flow, areas of sheet flow at the upper ends of mid-channel sand/gravel bars, and eddies at downstream riffle edges; living areas for juvenile spikedace with slow to moderate flow velocities in shallow water with moderate amounts of instream cover; living areas for larval spikedace with slow to moderate flow velocities in shallow water with abundant instream cover; sand, gravel, and cobble substrates with low to moderate amounts of fine sediment and substrate embeddedness; pool, riffle, run, and backwater components present in the aquatic habitat; low stream

gradient; water temperatures in the approximate range of 35 to 65 degrees Fahrenheit; abundant aquatic insect food base; periodic natural flooding; a natural, unregulated hydrograph or, if the flows are modified or regulated, then a hydrograph that demonstrates an ability to support a native fish community, and; habitat devoid of nonnative aquatic species detrimental to spinedace or habitat in which detrimental nonnative species are at levels that allow the persistence of spinedace.

The constituent elements are generalized descriptions and ranges of selected habitat factors that are critical for the survival and recovery of spinedace. The appropriate and desirable level of these factors may vary seasonally and is highly influenced by site-specific circumstances. Therefore, assessment of the presence/absence, level, or value of the constituent elements must include consideration of the season of concern and the characteristics of the specific location. The constituent elements are not independent of each other and must be assessed holistically, as a functioning system, rather than individually. In addition, the constituent elements need to be assessed in relation to larger habitat factors, such as watershed, floodplain, and streambank conditions, stream channel geomorphology, riparian vegetation, hydrologic patterns, and overall aquatic faunal community structure.

Seven individual critical habitat complexes make up critical habitat for spinedace. Spinedace likely occupy Complex 1, the Verde River Complex, but at reduced numbers. Recent surveys have failed to locate spinedace, but have been less than thorough. The last known records are two fish found in 1999 by the Arizona Game and Fish Department. The tributary streams to the Verde are believed to be unoccupied at this time. Spinedace are not known to occur either historically or currently in Complex 2, the Black River Complex. It is not known if they can exist at the higher elevations found within this complex. Currently, elevation data are not definitive. Additionally, the Salt River Subbasin within this Complex occurs at lower elevations, and is a significant portion of spinedace historical range. This subbasin currently has no existing populations of spinedace. Large areas of the subbasin are unsuitable, either because of topography or because of reservoirs, stream channel alteration by humans, or overwhelming nonnative species populations.

Within Complex 3, the Tonto Creek Complex, spinedace are known to have occupied Tonto Creek. Suitable habitat still exists, although degradation has occurred due to watershed uses, water diversion, agriculture, roads, and nonnative species introduction. Complex 4, the Middle Gila/Lower San Pedro/Aravaipa Creek Complex, is occupied by spinedace with its population status ranging from rare to common. Aravaipa Creek supports some of the best and most protected spinedace populations due to special use designations on Bureau of Land Management (BLM) land, substantial ownership by The Nature Conservancy, and planned construction of fish barriers to prevent invasion of nonnative fish species.

Complex 5, the Middle-Upper San Pedro River Complex, is currently unoccupied by spinedace. However, the San Pedro River is the type locality of spinedace, and this complex contains important restoration areas. Complex 6, the Gila Box/San Francisco River Complex, is the complex in which the proposed action will occur. The only spinedace population remaining in the complex is in Eagle Creek. However, substantial restoration potential for spinedace exists in the remainder of the complex. This

complex has the largest area of habitat suitable for spikedace restoration.

Complex 7, the Upper Gila River Complex in Grant, Catron, and Hidalgo Counties, New Mexico, is occupied throughout by spikedace, and contains the largest remaining population of spikedace. Because of its remoteness, there is a relatively low degree of habitat threats in this complex.

As noted above under loach minnow, rangewide, 155 consultations have been completed or are underway for actions affecting spikedace and loach minnow. The majority of this opinions concerned the effects of grazing (53 consultations), roads and bridges (24 opinions), or agency planning (23 opinions). Additional consultations (55 consultations) dealt with timber harvest, fire, flooding, recreation, realty, animal stocking, water development, recovery, and water quality issues. Adverse effects to spikedace have occurred due to these projects and many of these consultations have required reasonable and prudent measures to minimize effects to spikedace. However, the species is still declining.

The status of spikedace is declining rangewide. Although it is currently listed as threatened, the FWS has found that a petition to uplist the species to endangered status is warranted. A reclassification proposal is pending, however, work on it is precluded due to work on other higher priority listing actions (USFWS 1994c).

Chiricahua leopard frog

The Chiricahua leopard frog (*Rana chiricahuensis*) was listed as a threatened species without critical habitat on June 13, 2002 (USFWS 2002). Included was a special rule to exempt operation and maintenance of livestock tanks on non-Federal lands from the section 9 take prohibitions of the Act. The frog is distinguished from other members of the *Rana pipiens* complex by a combination of characters, including a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background; dorsolateral folds that are interrupted and deflected medially; stocky body proportions; relatively rough skin on the back and sides; and often green coloration on the head and back (Platz and Mecham 1979). The species also has a distinctive call consisting of a relatively long snore of 1 to 2 seconds in duration (Davidson 1996, Platz and Mecham 1979). Snout-vent lengths of adults range from approximately 2.1 to 5.4 inches (Stebbins 2003, Platz and Mecham 1979). The Ramsey Canyon leopard frog (*Rana subaquavocalis*) is similar in appearance to the Chiricahua leopard frog, but it may grow to a larger size and has a distinct call that is often given under water (Platz 1993).

The Chiricahua leopard frog is an inhabitant of cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 3,281 to 8,890 feet in central and southeastern Arizona; west-central and southwestern New Mexico; and northern Sonora, the Sierra Madre Occidental of Chihuahua, and northern Durango, Mexico (Platz and Mecham 1984, Jennings and Scott 1993, Degenhardt *et al.* 1996, Sredl *et al.* 1997, Sredl and Jennings *in press*). Reports of the species from the State of Aguascalientes (Diaz and Diaz 1997) are questionable; however, the distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa

(especially *Rana montezumae*) in the southern part of the range of the Chiricahua leopard frog. In New Mexico, of sites occupied by Chiricahua leopard frogs from 1994-1999, 67 percent were creeks or rivers, 17 percent were springs or spring runs, and 12 percent were stock tanks (Painter 2000). In Arizona, slightly more than half of all known historical localities are natural lotic systems, a little less than half are stock tanks, and the remainder are lakes and reservoirs (Sredl *et al.* 1997). Sixty-three percent of populations extant in Arizona from 1993-1996 were found in stock tanks (Sredl and Saylor 1998).

Northern populations of the Chiricahua leopard frog along the Mogollon Rim and in the mountains of west-central New Mexico are disjunct from those in southeastern Arizona, southwestern New Mexico, and Mexico. Recent genetic analyses, including a 50-loci starch gel survey, morphometrics, and analyses of nuclear DNA support describing the northern populations as a distinct species (Platz and Grudzien 1999). Multiple haplotypes within *chiricahuensis* were also identified using mitochondrial DNA analysis (Benedict and Quinn 1999), providing further evidence of genetically distinct population segments.

Die-offs of Chiricahua leopard frogs were first noted in former habitats of the Tarahumara frog (*Rana tarahumarae*) in Arizona at Sycamore Canyon in the Pajarito Mountains (1974) and Gardner Canyon in the Santa Rita Mountains (1977-78) (Hale and May 1983). From 1983-1987, Clarkson and Rorabaugh (1989) found Chiricahua leopard frogs at only two of 36 Arizona localities that had supported the species in the 1960s and 1970s. Two new populations were reported. During subsequent extensive surveys from 1994-2001, the Chiricahua leopard frog was found at 87 sites in Arizona, including 21 northern localities and 66 southern localities (Sredl *et al.* 1997, Rosen *et al.* 1996, FWS files). In New Mexico, the species was found at 41 sites from 1994 - 1999; 31 of those were verified extant during 1998-1999 (Painter 2000). During May-August 2000, the Chiricahua leopard frog was found extant at only eight of 34 sites where the species occurred in New Mexico during 1994-1999 (C. Painter, pers. comm. 2000). The species has been extirpated from about 75 percent of its historical localities in Arizona and New Mexico. The status of the species in Mexico is unknown.

Based on Painter (2000) and the latest information for Arizona, the species is still extant in most major drainages in Arizona and New Mexico where it occurred historically; with the exception of the Little Colorado River drainage in Arizona and possibly the Yaqui drainage in New Mexico. It has also not been found recently in many rivers, valleys, and mountains ranges, including the following in Arizona: White River, West Clear Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, and Sonoita Creek mainstem. In southeastern Arizona, no recent records (1995 to the present) exist for the following mountain ranges or valleys: Pinaleno Mountains, Peloncillo Mountains, Sulphur Springs Valley, and Huachuca Mountains. Moreover, the species is now absent from all but one of the southeastern Arizona valley bottom cienega complexes. In many of these regions Chiricahua leopard frogs were not found for a decade or more despite repeated surveys.

Recent surveys suggest the species may have recently disappeared from some major drainages in New Mexico (C. Painter, pers. comm. 2000).

Threats to this species include predation by nonnative organisms, especially bullfrogs, fish, and crayfish; disease; drought; floods; degradation and loss of habitat as a result of water diversions and groundwater pumping, poor livestock management, a history of fire suppression and grazing that has increased the likelihood of crown fires, mining, development, and environmental contamination; disruption of metapopulation dynamics; and increased chance of extirpation or extinction resulting from small numbers of populations. Loss of Chiricahua leopard frog populations is part of a pattern of global amphibian decline, suggesting other regional or global causes of decline may be important as well (Carey *et al.* 2001). Numerous studies indicate that declines and extirpations of Chiricahua leopard frogs are at least in part caused by predation and possibly competition with nonnative organisms, including fish in the family Centrarchidae (*Micropterus* spp., *Lepomis* spp.), bullfrogs (*Rana catesbeiana*), tiger salamanders (*Ambystoma tigrinum mavortium*), crayfish (*Orconectes virilis* and possibly others), and several other species of fish (Fernandez and Rosen 1998, 1996; Rosen *et al.* 1996; 1994; Snyder *et al.* 1996; Fernandez and Bagnara 1995; Sredl and Howland 1994; Clarkson and Rorabaugh 1989). For instance, in the Chiricahua region of southeastern Arizona, Rosen *et al.* (1996) found that almost all perennial waters investigated that lacked introduced predatory vertebrates supported Chiricahua leopard frogs. All waters except three that supported introduced vertebrate predators lacked Chiricahua leopard frogs. Sredl and Howland (1994) noted that Chiricahua leopard frogs were nearly always absent from sites supporting bullfrogs and nonnative predatory fish. Rosen *et al.* (1996) suggested further study was needed to evaluate the effects of mosquitofish, trout, and catfish on frog presence.

Disruption of metapopulation dynamics is likely an important factor in regional loss of populations (Sredl *et al.* 1997, Sredl and Howland 1994). Chiricahua leopard frog populations are often small and habitats are dynamic, resulting in a relatively low probability of long-term population persistence. Historically, populations were more numerous and closer together. If populations winked out due to drought, disease, or other causes, extirpated sites could be recolonized via immigration from nearby populations. However, as numbers of populations declined, populations became more isolated and were less likely to be recolonized if extirpation occurred. Also, most of the larger source populations along major rivers and at cienega complexes have disappeared.

Fire frequency and intensity in Southwestern forests are much altered from historical conditions (Dahms and Geils 1997). Before 1900, surface fires generally occurred at least once per decade in montane forests with a pine component. Beginning about 1870-1900, these frequent ground fires ceased to occur due to intensive livestock grazing that removed fine fuels, followed by effective fire suppression in the mid to late 20th century (Swetnam and Baisan 1996). Absence of ground fires allowed a buildup of woody fuels that precipitated infrequent but intense crown fires (Danzer *et al.* 1997, Swetnam and Baisan 1996). Absence of vegetation and forest litter following intense crown fires exposes soils to surface and rill erosion during storms, often causing high peak flows, sedimentation, and erosion in

downstream drainages (DeBano and Neary 1996). Following the 1994 Rattlesnake fire in the Chiricahua Mountains, Arizona, a debris flow filled in Rucker Lake, an historical Chiricahua leopard frog locality. Leopard frogs (either Chiricahua or Ramsey Canyon leopard frogs) apparently disappeared from Miller Canyon in the Huachuca Mountains, Arizona, after a 1977 crown fire in the upper canyon and subsequent erosion and scouring of the canyon during storm events (Tom Beatty, Miller Canyon, pers. comm. 2000). Leopard frogs were historically known from many localities in the Huachuca Mountains; however, natural pool and pond habitat is largely absent now and the only breeding leopard frog populations occur in man-made tanks and ponds. Crown fires followed by scouring floods are a likely cause of this absence of natural leopard frog habitats. Bowers and McLaughlin (1994) list six riparian plant species they believed might have been eliminated from the Huachuca Mountains as a result of floods and debris flow following destructive fires.

An understanding of the dispersal abilities of Chiricahua leopard frogs is key to determining the likelihood that suitable habitats will be colonized from a nearby extant population of frogs. As a group, leopard frogs are surprisingly good at dispersal. In Michigan, young northern leopard frogs (*Rana pipiens*) commonly move up to 0.5 mile from their place of metamorphosis, and 3 young males established residency up to 3.2 miles from their place of metamorphosis (Dole 1971). Both adults and juveniles wander widely during wet weather (Dole 1971). In the Cypress Hills, southern Alberta, young-of-the-year northern leopard frogs successfully dispersed to downstream ponds 1.3 mile from the source pond, upstream 0.6 mile, and overland 0.25 mile. At Cypress Hills, a young-of-the-year northern leopard frog moved 5 miles in one year (Seburn *et al.* 1997). After the first rains in the Yucatan Peninsula, Rio Grande leopard frogs have been collected a few miles from water (Campbell 1998). In New Mexico, Jennings (1987) noted collections of Rio Grande leopard frogs from intermittent water sources and suggested these were frogs that had dispersed from permanent water during wet periods.

Dispersal of leopard frogs away from water in the arid Southwest may occur less commonly than in mesic environments in Alberta, Michigan, or the Yucatan Peninsula during the wet season. However, there is evidence of substantial movements even in Arizona. The Rio Grande leopard frog (*Rana berlandieri*) in southwestern Arizona has been observed to disperse at least one mile from any known water source during the summer rainy season (Rorabaugh, *in press*). Frogs may actively traverse streamcourses or uplands, and tadpoles may be carried passively along streamcourses. In 1974, Frost and Bagnara (1977) noted passive or active movement of Chiricahua and Plains (*Rana blairi*) leopard frogs for 5 miles or more along East Turkey Creek in the Chiricahua Mountains. In August 1996, Rosen and Schwalbe (1998) found up to 25 young adult and subadult Chiricahua leopard frogs at a roadside puddle in the San Bernardino Valley, Arizona. They believed that the only possible origin of these frogs was a stock tank located 3.4 miles away. Rosen *et al.* (1996) found small numbers of Chiricahua leopard frogs at two locations in Arizona that supported large populations of nonnative predators. The authors suggested these frogs could not have originated at these locations because successful reproduction would have been precluded by predation. They found that the likely source of these animals were populations 1.2-4.3 miles distant. In the Dragoon Mountains, Arizona, Chiricahua

leopard frogs breed at Halfmoon Tank, but frogs occasionally turn up at Cochise Spring (0.8 mile down canyon in an ephemeral drainage from Halfmoon Tank) and in Stronghold Canyon (1.1 mile down canyon from Halfmoon Tank). There is no breeding habitat for Chiricahua leopard frogs at Cochise Spring or Stronghold Canyon, thus it appears observations of frogs at these sites represent immigrants from Halfmoon Tank. In the Chiricahua Mountains, a population of Chiricahua leopard frogs disappeared from Silver Creek stock tank after the tank dried up; but frogs then began to appear in Cave Creek, which is about 0.6 mile away, again, suggesting immigration. Movements by leopard frogs away from water do not appear to be random. Streams are important dispersal corridors for young northern leopard frogs (Seburn *et al.* 1997). Displaced northern leopard frogs will home, and apparently use olfactory and auditory cues, and possibly celestial orientation, as guides (Dole 1968, 1972). Rainfall or humidity may be an important factor in dispersal because odors carry well in moist air, making it easier for frogs to find other wetland sites (Sinsch 1991).

Recent evidence suggests a chytridiomycete skin fungi is responsible for observed declines of frogs, toads, and salamanders in portions of Central America (Panama and Costa Rica), South America (Atlantic coast of Brazil, Ecuador, and Uruguay), Australia (eastern and western States), New Zealand (South Island), Europe (Spain and Germany), Africa (South Africa, “western Africa”, and Kenya), Mexico (Sonora), and United States (8 States) (Speare and Berger 2000, Longcore *et al.* 1999, Berger *et al.* 1998, Hale 2001). Ninety-four species of amphibians have been diagnosed as infected with the chytrid, *Batrachochytrium dendrobatidis*. The proximal cause of extinctions of 2 species of Australian gastric brooding frogs and the golden toad (*Bufo periglenes*) in Costa Rica was likely chytridiomycosis. Another species in Australia for which individuals were diagnosed with the disease may be extinct (Daszak 2000). In Arizona, chytrid infections have been reported from four populations of Chiricahua leopard frogs (M. Sredl, pers. comm. 2000), as well as populations of Rio Grande leopard frog (*Rana berlandieri*), Plains leopard frog (*Rana blairi*), lowland leopard frog (*Rana yavapaiensis*), Tarahumara frog (*Rana tarahumarae*), bullfrog, canyon treefrog (*Hyla arenicolor*), and Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*) (Bradley *et al.* 2002, Hale 2001, Davidson *et al.* 2000, Sredl and Caldwell 2000, Morell 1999). In New Mexico, chytridiomycosis was identified in a declining population near Hurley, and recent patterns of decline at 3 other populations are consistent with chytridiomycosis (R. Jennings, pers. comm. 2000). Die-offs occur during the cooler months from October-February. High temperatures during the summer may slow reproduction of chytrids to a point at which the organism can not cause disease (Bradley *et al.* 2002).

The role of the fungi in the population dynamics of the Chiricahua leopard frog is as yet undefined. It is clear that Chiricahua leopard frog populations can exist with the disease for extended periods. The frog has coexisted with chytridiomycosis in Sycamore Canyon, Arizona since at least 1974. However, at a minimum, it is an additional stressor, resulting in periodic die-offs that increase the likelihood of extirpation and extinction. It may well prove to be an important contributing factor in observed population decline, and because of the interchange of individuals among subpopulations, metapopulations of frogs may be particularly susceptible. Rapid death of all or most frogs in stock tank populations in a metapopulation of Chiricahua leopard frogs in Grant County, New Mexico was

attributed to post-metamorphic death syndrome (Declining Amphibian Populations Task Force 1993). Hale and May (1983) and Hale and Jarchow (1988) believed toxic airborne emissions from copper smelters killed Tarahumara frogs and Chiricahua leopard frogs in Arizona and Sonora. However in both cases, symptoms of moribund frogs matched those of chytridiomycosis. The disease has now been documented to have been associated with Tarahumara frog die-offs since 1974 (Hale 2001). The earliest record for chytridiomycosis in Arizona (Tarahumara frog -1974) corresponds to the first observed mass die-offs of ranid frogs in Arizona.

The origin of the disease is unknown, but epizootiological data from Central America and Australia (high mortality rates, wave-like spread of declines, wide host range) suggest introduction of the disease into naïve populations and the disease subsequently becoming enzootic in some areas. Alternatively, the fungus may be a widespread organism that has emerged as a pathogen because of either higher virulence or an increased host susceptibility caused by other factors such as environmental changes (Berger *et al.* 1998), including changes in climate or microclimate, contaminant loads, increased UV-B radiation, or other factors that cause stress (Carey *et al.* 1999, 2001; Daszak 2000; Pounds and Crump 1994). If it is a new introduction, its rapid colonization could be attributable to humans. The fungus does not have an airborne spore, so it must spread via other means. Amphibians in the international pet trade (Europe and USA), outdoor pond supplies (USA), zoo trade (Europe and USA), laboratory supply houses (USA), and species recently introduced (*Bufo marinus* in Australia and bullfrog in the USA) have been found infected with chytrids, suggesting human-induced spread of the disease (Daszak 2000). Free-ranging healthy bullfrogs with low-level chytridiomycosis infections have been found in southern Arizona. These and other native or nonnative frogs may serve as disease vectors or reservoirs of infection (Bradley *et al.* 2002). Chytrids could also be spread by tourists or fieldworkers sampling aquatic habitats (Halliday 1998). The fungus can exist in water or mud and thus could be spread by wet or muddy boots, vehicles, cattle, and other animals moving among aquatic sites, or during scientific sampling of fish, amphibians, or other aquatic organisms. The Fish and Wildlife Service and Arizona Game and Fish Department are employing preventative measures to ensure the disease is not spread by aquatic sampling.

Additional information about the Chiricahua leopard frog can be found in Painter (2000), Sredl *et al.* (1997), Degenhardt *et al.* (1996), Jennings (1995), Rosen *et al.* (1996, 1994), Sredl and Howland (1994), Jennings and Scott (1993), Platz and Mecham (1984, 1979), and Sredl and Jennings (*in press*).

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action

now under consultation.

A. Status of the species and critical habitat within the action area

Loach minnow

Fifty-one miles of the Blue River extending from the confluence with the San Francisco River upstream to the confluence of Campbell Blue and Dry Blue creeks is considered occupied by loach minnow (USFWS 2000). Both of these diversions occur within this occupied range of the Blue River. The BAE notes that both diversions have occupied habitat above and below the structures. For the Coleman diversion, positive surveys for loach minnows have occurred 7.6 river miles upstream from the project area and 1.0 river mile downstream. Occupied habitat is 2.4 river miles upstream of the Marks diversion and 6.8 river miles downstream. Both diversion sites are considered critical habitat for loach minnow. The diversion sites lacks many of the constituent elements as described in Table 1 (USFS 2003).

Constituent Element	Condition within the Area of the Diversion Structure
Permanent, flowing, and unpolluted H ₂ O.	The area has permanent, flowing, unpolluted water; however the flows are reduced from diversions in the area.
Moderate to swift H ₂ O velocity with gravel to rubble substrate.	The site of the diversions have an increased water depth and accumulation of fine sediments behind the structure
Moderate to swift H ₂ O velocity with sand to rubble substrate.	The area behind the diversions have an increased water depth which reduces water velocity. There is an accumulation of fine sediments up stream of the diversions.
Slow to moderate H ₂ O velocity in shallow H ₂ O with sand to rubble substrate and abundant instream cover.	The site of the diversions have an increased water depth which reduces water velocity. The historical instability of diversion structures along the Blue has reduced instream cover.
Slow to swift H ₂ O velocity in shallow H ₂ O with uncemented cobble to rubble substrate.	The site of the diversions have an increased water depth which reduces water velocity. The historical instability of diversion structures along the Blue has reduced instream cover.
Low amount of fine sediment and embeddedness.	Diversions have changed the temporal sediment transport in the Blue River and have resulted in an increased sediment load and embeddedness.
Riffle, run, and backwater components.	The periodic failure of the diversions have caused instability in the area and thus reduced the potential for complexity of aquatic habitat.
Low to moderate stream gradient.	The diversions have increased the gradient immediately downstream of the structures. In addition, the periodic failure of the structures has created an unstable gradient in the area.
H ₂ O between 35-85°F with natural diurnal and seasonal variation.	The periodic failure of the diversions have likely increased the overall temperature and diurnal temperature variation.

Abundant insect food base.	The periodic failure of the diversions have caused instability within the reach and thus reduced the potential for complexity of riparian and aquatic habitat. This likely reduces the potential for abundant terrestrial and aquatic insects.
Periodic natural flooding	The diversions are not affecting periodic natural flooding
A hydrograph that demonstrates the ability to support a native fish community.	The diversions have reduced spring and summer instream flows and therefore have probably affected native fish communities.
Few or no predatory or competitive non-native aquatic species present.	From visual observations, there are few non-native aquatic species within the reach. However, the pooling of water behind the diversions may have improved habitat for non-native aquatic species.

Although, the area at the structures appear to lack many of the constituent elements, other portions of the action area is occupied by fish. Loach minnow continue to use the habitat and move through the area.

Spikedace

Spikedace were generally believed to have been extirpated from this area of the Blue River 40 years ago (Propst *et al.* 1986, Sublette *et al.* 1990). Both diversion sites are considered critical habitat for spikedace. The action area lacks many of the constituent elements as described in Table 1.

Chiricahua leopard frog

Chiricahua leopard frogs have been documented 6.3 river miles upstream from the Marks diversion and 10.6 miles downstream from the Coleman diversion. Historically, Chiricahua leopard frogs have been documented from aquatic habitat across the Apache-Sitgreaves National Forest. Along the Blue River, surveys for Chiricahua leopard frogs resulted in detections beginning in the 1970s and continuing into 2002. However, these surveys have not been regular or thorough. With respect to the Blue River system in its entirety, Chiricahua leopard frogs have been located as far north as the Jackson Box area, and as far south as Juan Miller Crossing. Chiricahua leopard frogs have also been located on the Upper Campbell Blue drainage. Multiple records exist throughout the upper third of the Blue River. The Blue River is a continuous system, with numerous tributaries. Suitable habitat occurs in the action area and Chiricahua leopard frogs can migrate up to five miles (Seburn *et al.* 1997). Due to frog detections, the continuity and availability of habitat, and the dispersal abilities of the frog, the FWS concludes that it is likely that the action area is occupied.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have

no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Loach minnow and Spikedace Critical Habitat

Repair of the diversion structure will affect many of the constituent elements to spikedace and loach minnow critical habitat. The effects to the constituent element of loach minnow and spikedace critical habitat are described below in Table 2.

Table 2: Effects to Constituent Elements of Loach Minnow and Spikedace Critical Habitat	
Constituent Element	Effects of the Action
Permanent, flowing, and unpolluted H ₂ O.	Lowering of diversion height from previous height will slightly increase flows.
Moderate to swift H ₂ O velocity with gravel to rubble substrate.	No change in the reach condition.
Moderate to swift H ₂ O velocity with sand to rubble substrate.	No change in the reach condition.
Slow to moderate H ₂ O velocity in shallow H ₂ O with sand to rubble substrate and abundant instream cover.	No change in the reach condition.
Slow to swift H ₂ O velocity in shallow H ₂ O with uncemented cobble to rubble substrate.	No change in the reach condition.
Low amount of fine sediment and embeddedness.	The use of clean cobble and rubble diversion materials and the removal/spreading of dredge materials will reduce the influx of sediment.
Riffle, run, and backwater components.	Lowering of diversion height will slightly reduce the instability of the reach.
Low to moderate stream gradient.	Lowering of the diversion height will slightly reduce the length of the steep gradient immediately downstream and slightly reduce gradient instability within the reach.
H ₂ O between 35-85°F with natural diurnal and seasonal variation.	Lowering of diversions height will slightly reduce the instability of the reach.
Abundant insect food base.	No change in the reach condition.
Periodic natural flooding	No change in the reach condition.
A hydrograph that demonstrates the ability to support a native fish community.	Lowering of diversions height will slightly increase spring and summer instream flows.
Few or no predatory or competitive non-native aquatic species present.	No change in the reach condition.

Rebuilding the diversion structure in the active channel will alter water flow in the area and the stability of the reach. The stream substrate within the immediate action area will undergo increased disturbance, compaction, and sedimentation. Due to the diversion structures, the reaches do not have the opportunity to improve the habitat quality for loach minnow.

The rebuilding of the diversion could create an increase in fine sediments in the area. The Forest is incorporating many measures into the project design to ensure that there is not an increase in fine sediments due to the project. For example, the Forest is using plastic sheeting and clean river rock only for diversion structures. However, any increase in fine sediment production is of concern due to the already large amounts of fine sediment moving through the system. The backhoe in the active channel will temporarily disturb and move fine sediments in the system that could move downstream.

Loach Minnow

It is thought that the footprint of the diversion structures includes an area of unsuitable habitat due to the lack of complexity and amount of fines in the area. However, loach minnow occupy the Blue River upstream and downstream of these diversion structures. It is therefore reasonable to conclude that loach minnow could be moving through the area. The Forest proposes to electroshock the area before work begins to remove any loach minnow from the area during diversion construction. Electroshocking of fish is in itself a harassment to fish. Fish can be stressed due to the electric shock and handling. In addition, electroshocking can cause fish mortality (Nielsen 1998).

Electroshocking cannot provide a guarantee that there are not fish left in the area. The construction of the diversion can still have direct effects to any fish left in the area. Since this is the spawning season, there is a likelihood that the backhoe could crush fish and/or eggs remaining in the area. Eggs are attached to rocks and adults tend to hide among the rocks in response to disturbance, thus both are very vulnerable to mortality during activities that disturb the streambed. In addition, the backhoe will cause disturbances to the substrate that could effect loach minnow downstream. Algal and invertebrate communities in the substrate could be destroyed or buried as work occurs on the diversion. This would adversely affect the food supply of loach minnow in the area. Although some mortality may occur, in general, the effects are expected to be localized and short-term.

Work on the diversion structure with a backhoe will also increase the fine sediment moving downstream. Initial work will occur during the breeding season of this fish and the increased sediment load could effect the reproduction of loach minnow downstream. In addition, the activity may smother loach minnow eggs.

Table 3 briefly describes the effects to fish due to changes in the river system due to the diversion structures.

Table 3. The effects of diversion structure, resulting effects on biological needs of the fish, and potential harm or harassment of the fish themselves.		
Effect	Results In	Which May Harm or Kill Fish by
Changes to temperature regimes, flow patterns, and/or oxygen levels due to changes in flow patterns, amount of water in the channel, and alteration of riparian vegetation	a decrease in the number of type of prey items	starvation.
Addition of excess sediment to the channel, which fills in crevices in the rocks used by fish	a decrease in available crevices for suitable cover	predation.
	a decrease in suitable sites/surfaces for egg deposition	prevention of successful reproduction.
	a decrease in successful hatching due to smothering of deposited eggs	prevention of successful reproduction.
Alteration of the channel morphology, resulting in fewer shallow riffle complexes	entrainment of fish in deep or rapidly flowing water	causing physical damage to the fish themselves.
	a decrease in abundance of suitable habitat	delay in or prevention of successful reproduction.

The Apache-Sitgreaves National Forest is being making every effort to avoid pollution of the waters from use of the backhoe in the active channel. However, the use of machinery in the river and its floodplain would have a short-term increased risk from pollution from petroleum products associated with the backhoe. Both minor leakage or deposition and the possibility of an accident could release substantial quantities of oil and gas and have significant effects on aquatic organisms. The effects of accidental spills cannot be addressed in this document, as it is outside of the scope of this consultation.

The two diversion structures within the Blue River will transport water from the river to irrigate agricultural lands. This water is owned by the private landowners. However, the diversion structures will reduce the amount of water available downstream to loach minnow in the spring and summer. The reduction in water will effect the hydrology of the system and ultimately effect loach minnow.

Maintenance of the diversion ditches could also have adverse effects to the loach minnow in the area. Although the Forest is implementing measures to reduce sediment input from the ditch to the Blue River (haybales blocking the ditch to catch sediment), there is still the possibility of increased sediment load to the system. This will create a short-term disturbance to loach minnow habitat.

Chiricahua leopard frogs

Chiricahua leopard frogs have been found 6.3 river miles upstream from the Marks diversion and 10.6

miles from the Coleman diversion. The action area has not been surveyed for frogs but suitable habitat exists and the species is likely present. Before construction work will begin, Chiricahua leopard frogs could be harmed due to electroshocking for loach minnow. Electroshocking and handling could also stress the frogs. In addition, the backhoe could crush frogs or eggs that were not found during the temporarily removal. It is not likely that frogs would be within the substrate of the instream work area due to the substrate being well cemented in this area. Frogs could also be temporarily disturbed by this action and may cause displacement of individuals from the area.

As mentioned under the effects to loach minnow, the Apache-Sitgreaves National Forest is being very careful to avoid pollution of the waters from use of the backhoe in the active channel. However, the use of machinery in the river and its floodplain would have a short-term increased risk from pollution from petroleum products associated with the backhoe. Both minor leakage or deposition and the possibility of an accident could release substantial quantities of oil and gas and have significant effects on aquatic organisms. Amphibians are very sensitive to environmental contaminants.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The proposed action occurs largely within the Apache Sitgreaves National Forest, although some effects may result to areas downstream. This action area is subject to a wide variety of uses as it flows through private, State, and Federal lands.

CONCLUSION

Loach Minnow

After reviewing the current status of the loach minnow, the environmental baseline for the action area, the effects of the proposed diversion construction and ditch maintenance in the Blue River and the cumulative effects, it is the Fish and Wildlife Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the loach minnow and is not likely to destroy or adversely modify designated critical habitat.

Spikedace Critical Habitat

After reviewing the current status of the spikedace, the environmental baseline for the action area, the effects of the proposed diversion construction and ditch maintenance in the Blue River and the cumulative effects, it is the Fish and Wildlife Service's biological opinion that the action, as proposed, is not likely to destroy or adversely modify designated spikedace critical habitat.

Chiricahua leopard frog

After reviewing the current status of the Chiricahua leopard frog, the environmental baseline for the action area, the effects of the proposed diversion construction and ditch maintenance in the Blue River and the cumulative effects, it is the Fish and Wildlife Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Chiricahua leopard frog.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Fish and Wildlife Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest or permit applicant so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest must report the progress of the action and its impact on the species to the Fish and Wildlife Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

Loach minnow

The Fish and Wildlife Service anticipates that all loach minnow in the area that will undergo electroshocking will be taken as a result of this proposed action. The incidental take is expected to be

in the form of death, capture, or harassment. Death will occur to some individuals due to electroshocking and operation of the backhoe in the active channel. Harassment will occur to individuals from the electroshocking and due to the increase in sedimentation from the project. Maintenance of the diversion ditch is also expected to harass loach minnow downstream of the project area. Total take is estimated to be 10 fish.

Chiricahua leopard frogs

The Fish and Wildlife Service anticipates that all Chiricahua leopard frogs caught during electroshocking will be taken as a result of this proposed action. The incidental take is expected to be in the form of death, wounds, trapping, or harassment. Death will occur to some individuals due to electroshocking and operation of the backhoe in the active channel. Harassment will occur to individuals from the electroshocking and due to the increase in sedimentation from the project. Total take is estimated to be 5 frogs and 5 tadpoles.

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

The following reasonable and prudent measures (and associated terms and conditions) are necessary and appropriate to minimize take of Loach minnow and Chiricahua leopard frogs. In order to be exempt from the prohibitions of section 9 of the Act, the Forest must comply with the terms and conditions and required reporting/monitoring requirements. The terms and conditions which implement the reasonable and prudent measures are non-discretionary.

Loach minnow

The proposed action contains adequate measures to reduce the extent of take. These include the pre-survey work to detect individuals, cleaning of vehicles, use of alternative materials to reduce fine sediments, and short-time frame of the action. We have not identified any additional measures that would further reduce the extent of the take.

Chiricahua leopard frogs

1. Conduct all proposed actions in a manner that will minimize direct mortality of Chiricahua leopard frogs.

- 1.1 When electrofishing for loach minnow, if any native frog or tadpole is detected, immediately shut off the power and remove the frog or tadpole from the area.
- 1.2 If a Chiricahua leopard frog or tadpole is found during ocular pre-surveys or during electroshocking, remove the frog from the action area and store in a safe place until the proposed action is finished. We suggest placing the frog or tadpole in a bucket of water with some leaf litter and storing it in the shade. At the conclusion of the proposed action place the frogs in an appropriate site nearby (ie. backwater area, pools).

2. Maintain complete and accurate records of actions which may result in take of Chiricahua leopard frogs.

- 2.1 The Forest shall report all fish and amphibians caught in the project area as described in the project plan and report these findings to the Arizona Ecological Services Field Office within 60 days of the completion of proposed action on the Forest.

Review requirement: If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review. The Forest Service must immediately provide an explanation of the causes of the taking and review with the AESO the need for reasonable and prudent measures.

Disposition of dead or injured listed species

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (telephone: (480) 835-8289) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. We recommend future surveys in the Blue River for both Chiricahua leopard frogs and loach minnow. This information would enhance our knowledge of the appropriate management cycle to maintain loach minnow and Chiricahua leopard frog habitat along the Blue River.
2. We recommend continuing to communicate to land owners the importance of responsible maintenance of diversion structures to reduce effects to threatened and endangered species.

REINITIATION NOTICE

This concludes formal consultation on the proposed action as outlined in the consultation request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action

that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The Fish and Wildlife Service appreciates the Forest Service's efforts to identify and minimize effects to listed species from this project. For further information please contact Jennifer Graves (x232) or Debra Bills (x239). Please refer to the consultation number, 02-21-03-F-0046, in future correspondence concerning this project.

Sincerely,

/s/ Steven L. Spangle
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Field Supervisor, Fish and Wildlife Service, Albuquerque, NM
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APPENDIX A – Concurrences

BALD EAGLE

The Forest Service requested our concurrence with a “may affect, not likely to adversely affect” determination for bald eagles. Bald eagles are common winter visitors along the Blue River and probably roost along the Blue River. The nearest known breeding bald eagles occur at Luna Lake, approximately 17 miles north and west of the proposed action. The proposed action area does not support an adequate food base to attract nesting bald eagles to the area. Wintering bald eagles traveling through the project vicinity may occasionally be disturbed by noise from equipment use at the site. However, disturbance is expected to be insignificant due to the short time frame of the action (approximately 6 hours). We therefore concur with the determination of may affect, not likely to adversely affect.

SPIKEDACE

The BAE concludes that the proposed action may affect, but is not likely to adversely affect spikedace. Spikedace are generally believed to have been extirpated from this area of the Blue River 40 years ago (Propst *et al.* 1986, Sublette *et al.* 1990). Spikedace have never been documented in the Blue River. However, they have been documented from the connecting San Francisco River and suitable habitat exists in the Blue River. The FWS therefore concurs that the project, as proposed, is not likely to adversely affect spikedace, given that spikedace have been extirpated from the Blue River for approximately 40 years.

RAZORBACK SUCKER

The historical presence of razorback suckers in the Blue River watershed has not been documented. Historical reports indicate the species may have been common in the Gila River, upstream nearly to the New Mexico border (Bestgen 1990). Beginning in 1981 and continuing until 1989, over 778,000 razorback suckers were stocked in the Gila River upstream and downstream of the San Francisco River by the U.S. Fish and Wildlife Service and Arizona Game and Fish Department (Hendrickson 1993). During this same time period, 330,000 razorback suckers were stocked in Eagle Creek, a tributary to the Gila River, less than 10 miles downstream of the San Francisco River, and about 167,000 razorbacks were stocked in the Blue River (Hendrickson 1993). Of the over 1.2 million razorback suckers stocked in the Gila River, Eagle Creek, and the Blue River, Hendrickson (1993) reports a total of only 4 recaptured individuals. Two of these were in Eagle Creek in 1987 and 1988 (one each year), and two were in the Blue River (both in 1987). Papoulias *et al.* (1989) report what may have been the same 2 recaptured fish reported by Hendrickson (1993), above, from the Blue River in 1987, and a total of 6 recaptures from Eagle Creek (5 in 1987, 1 in 1988). Extensive fish surveys of the Blue River and its tributaries, and the lower San Francisco River and its tributaries from 1994 to 1998 did not detect any razorback suckers (Bagley and Knowles 1994, Knowles 1994a, Knowles 1994b, Knowles 1995, and Bagley *et al.* 1996). Efforts during the 1996 in the San Francisco

and Blue rivers were directed at sampling pools to specifically search for razorback suckers (Bagley et al. 1996). A total of 37 pools were sampled and no razorback suckers were detected.

Razorback suckers are known to live well over 13 years (USFWS 1998). Thus, although not documented during surveys in the Blue River for 13 years, razorback suckers stocked in the 1980s may still exist in the system.

Relict razorback suckers, if present within the action area, may be temporarily disturbed by the proposed action. These individuals would likely be large adults. Pre-surveys would likely detect the presence of such individuals. The likelihood of razorback suckers existing in the Blue River is extremely remote. As such, the probability of an effect occurring to individual razorbacks from the proposed action is extremely unlikely to occur, and is therefore discountable. For these reasons we concur with the Forest's determination that the project, as proposed, is not likely to adversely affect razorback suckers.

MEXICAN GRAY WOLF

Historically, Mexican gray wolves were found in the eastern and central portions of Arizona. Wolves were known to occur on the Coronado National Forest and on portions of the Apache National Forest as well. Wolves are most commonly associated with Madrean evergreen forests and woodlands, including pine, oak woodlands, pinyon-juniper forests, riparian areas, and grasslands above 4,500 feet. Mexican gray wolves were extirpated from the wild in the U.S. by private and government control campaigns, and were listed as an endangered species in 1976. It is generally believed that naturally-occurring Mexican gray wolves no longer inhabit the United States (McBride 1980, Hoffmeister 1986).

A recovery plan, developed in 1982, recommended re-establishment of a wild population and maintenance of a captive population of wolves (USFWS 1982). Wolves were reintroduced on the Apache National Forest in March 1998. Reintroduced wolves are designated as an experimental non-essential population under the Act, which allows for greater management flexibility than would be possible if the wolves were classified as fully endangered. There are approximately 30 wolves in the wild at this time.

Since resident Mexican gray wolves, other than reintroduced wolves, are no longer believed to occur in the United States, there will be no direct effects to naturally occurring wolves from the proposed action and the numbers and reproduction of naturally occurring wolves will not be affected. Introduced wolves may be disturbed when proposed activities occur in areas they occupy. This disturbance is anticipated to be of short duration.

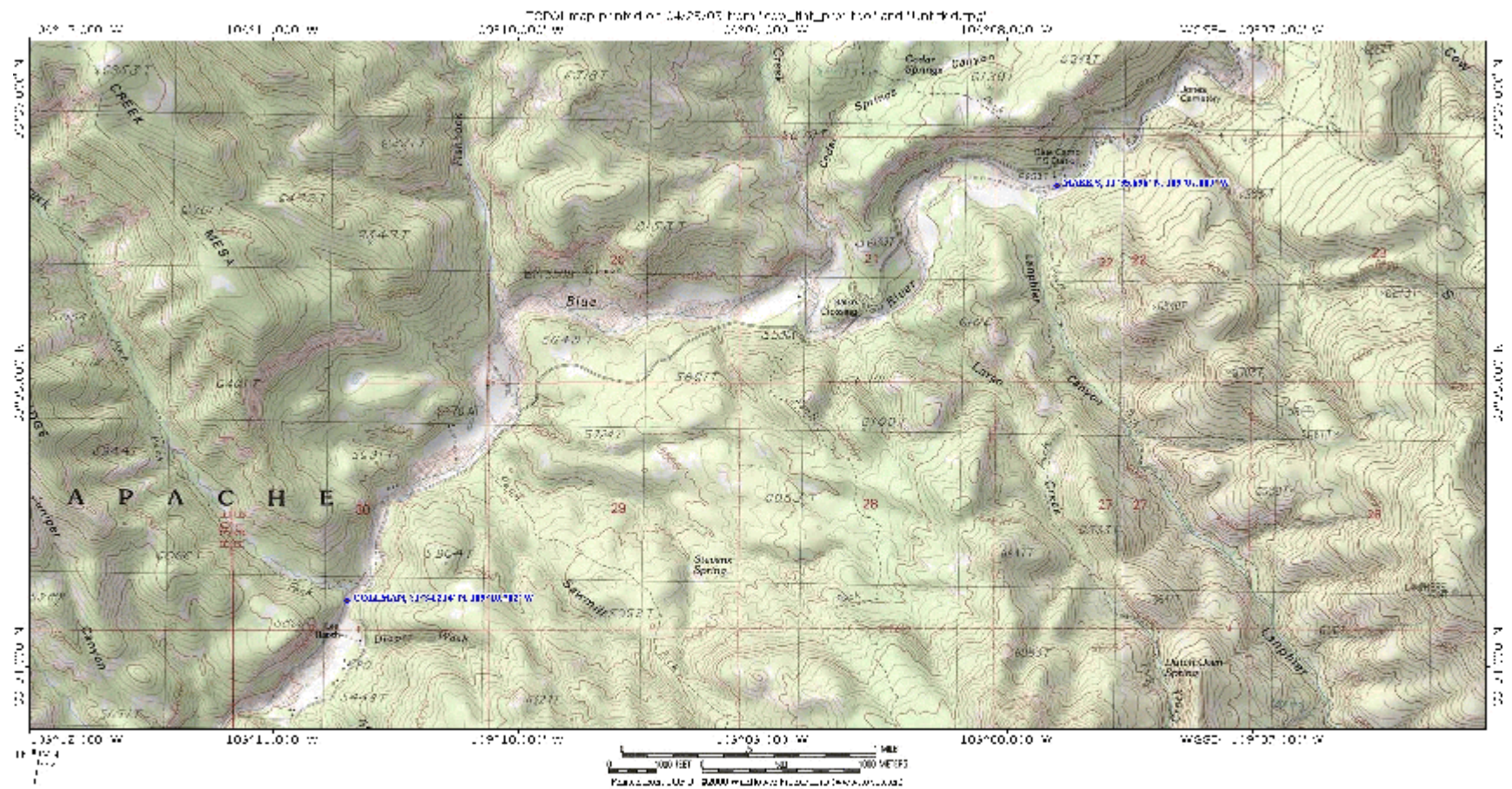
The Blue Range Wolf Recovery Area includes all of the Apache National Forest, and is divided into

primary and secondary recovery zones. The project area is within the primary recovery zone.

Because of their status as an experimental, non-essential population, wolves found in Arizona are treated as though they are proposed for listing for section 7 consultation purposes. By definition, an experimental non-essential population is not essential to the continued existence of the species. Therefore, no proposed action impacting a population so designated could lead to a jeopardy determination for the entire species. Thus, the FWS concurs with the Forest Service's determination of "not likely to jeopardize" the continued existence of the species.

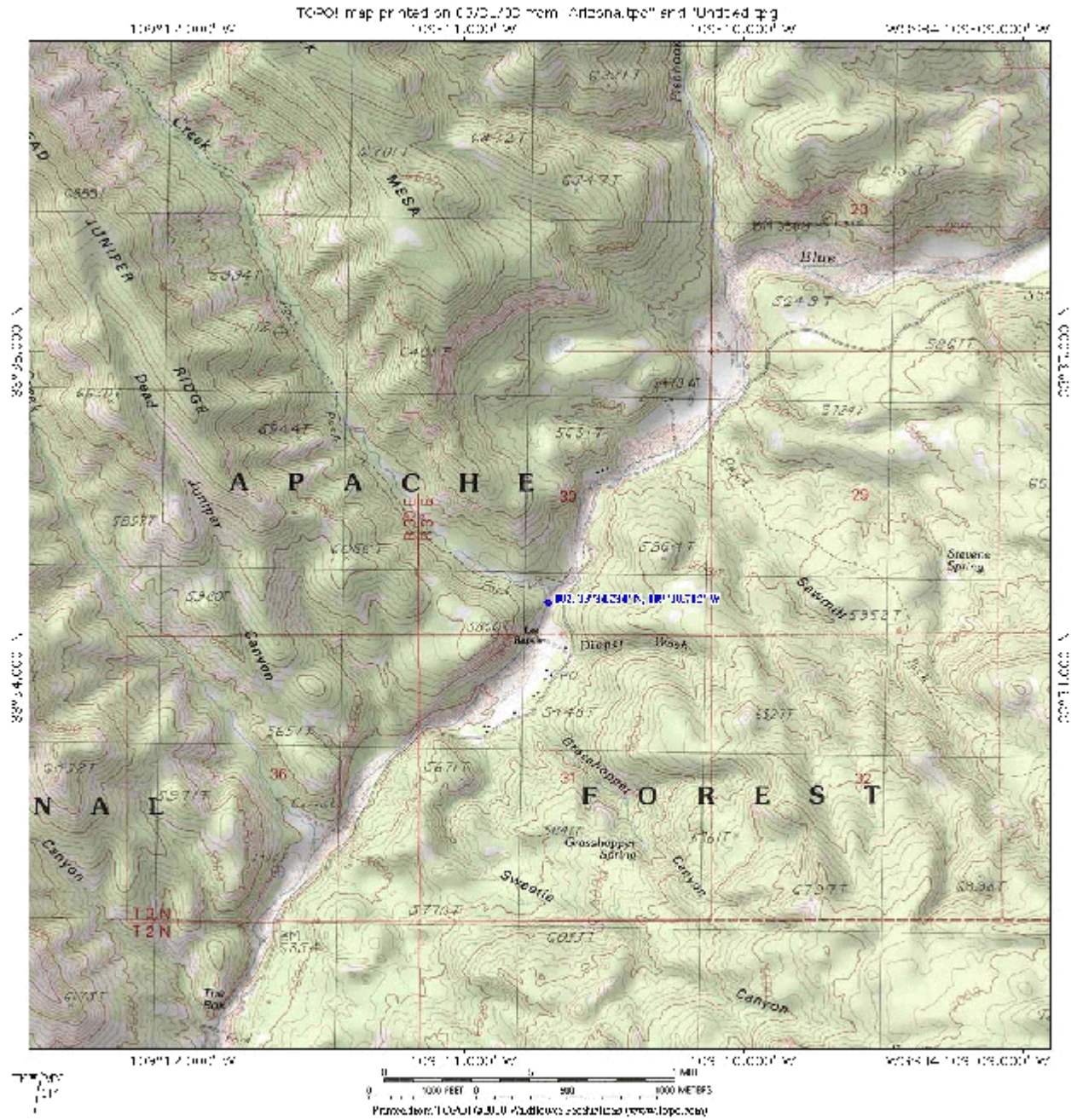
APPENDIX B – FIGURES

Figure 1: Marks and Coleman diversions



Reproduced from the USGS National Map Accuracy Act of 1967.

Figure 2: Coleman Diversion



Not subject to the provisions of the Freedom of Information Act

Figure 3: Marks Diversion

